Do Now: Exponent practice

Solve the following trigonometric ratios

a. tan(x)= ¾ b. sin(45) = 17/x c. cos(12) = x/10 d. sin(x+2) - 2 = 3/2

- Answer on your note catcher in the do now section
- Show all of your work

Standard F-TF.2.1: Graph all 6 basic trigonometric functions.

Objective: IWBAT create trigonometric ratios and find reference angles on a unit circle.

Essential Question: What is a reference angle and how can I find one?

Agenda

1. Do Now
2. Review unit circle
3. 9.1.3
4. Synthesis
5. Exit Ticket

Review Unit Circle

- Follow along as we explore more into logarithmic equations and clarify some misunderstandings
  - You are expected to:
    - Ask questions
    - Take notes
    - Clarify your understanding of the topics that we cover

Trigonometry Graphs

- On your paper draw a circle centered at the origin.
- Then draw a triangle that could represent René and Antonio's position on the wheel when The Screamer came to a sudden stop.
- Be sure to choose a different position from any of those you drew in problem 9-12.

a. Label the triangle with its height and its angle measure (from 0°).

b. Did any other riders have to climb the same distance to get to safety (up *or* down) as René and Antonio did? If so, draw the corresponding triangles and label them completely.

c. What is the relationship between these triangles? The angle in the first quadrant is called the **reference angle**. Work with your team to generalize a method for determining all of the other corresponding angles when you are given just one angle.

Think-Ink-Pair-Share

- Facilitator – Keeps the group on track and makes sure everyone participates.
- Task Manager – Reads the group questions aloud and manages timing.
- Recorder – Writes down group consensus or takeaways.
- Reporter – Shares group ideas with the class during the whole-group share.

Take 30 seconds to quickly decide who's doing what. Everyone will still do their own thinking and writing, but your group will compare answers together.

Think

Individually, think about these two angles:

- **210°** and **330°**
- What quadrant is each in?
- What is the reference angle for each?
- How do you figure that out?

Ink

Now write your own answers to these three prompts:

1. What quadrant is 210° in? What's its reference angle?
2. What quadrant is 330° in? What's its reference angle?
3. How did you find them? What was your method?"

Pair

Now it’s time to pair and share within your group.

- Start by going around and reading your answers out loud.
- If someone disagrees or did it differently, talk it out.
- Facilitator, make sure everyone speaks.
- Recorder, write down the group’s final thoughts or common strategies.

Share

“Now let’s hear from the class. Reporters, you’ll be sharing what your group discussed.”

Ask a few groups to share out:

- “What quadrant is 210° in and how did you find the reference angle?”
- “What did your group notice about 330°?”
- “Did any group have a unique way of thinking about it?”

Reference Angles

In problem 9-27, you used a unit circle to calculate the height of a seat on *The Screamer*. Can you use your graph of $y = \sin(\theta)$ instead to determine the height?

Use the Student eTool (Desmos) to determine the height of a seat that has rotated 130 degrees from the starting platform.

b. Are there any other seats at exactly the same height? If so, indicate them on your resource page.

c. How can you use the graph to calculate which angles correspond to seats with the same height? Discuss this with your team and be prepared to share your strategies with the class.

d. For each of the following angle measures, use the sine calculator from the resource page to determine the corresponding height and to locate another angle with the same corresponding height. Then sketch a small unit circle, draw in each pair of angles, and label their heights.

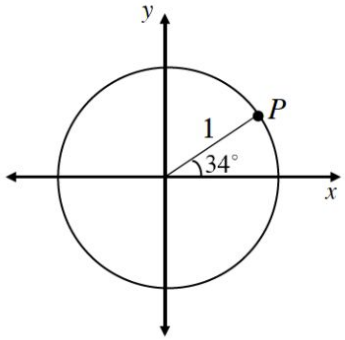
i. 80° *ii.* 200° *iii.* 310°

Reflection

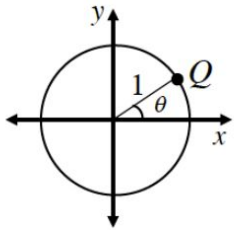
- Think about all that we have covered so far.
  - Answer the essential questions given in the beginning of class in the summary at the bottom of your note catcher
- If you finish early clear your tables for the exit slip.

More Trig

Work with your team to write the coordinates of point P on the unit circle shown below. Is there more than one way to determine the coordinates of point P? Be prepared to share your strategies with the class.



Now generalize what you found in problem 9-37 to write the coordinates of point Q on the unit circle shown below.

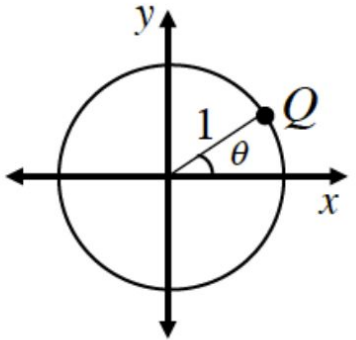


Reference Angles

In a unit circle, how can sine be used to give you information about a point on the circle? What about cosine? Explain.

If you know the sine of an angle in the unit circle, can you determine its cosine? How? Work with your team to create a strategy and be prepared to share it with the class.

The angle θ in the unit circle at right has a cosine of $\frac{3}{4}$.



a. What are the exact coordinates of point Q? Use the Pythagorean Theorem.

b. What is the exact value of $\sin(\theta)$?

c. Using what you determined in problems 9-39 and 9-40, rewrite the Pythagorean Theorem using trigonometric functions. When written like this, the Pythagorean Theorem is called the **Pythagorean Identity**.